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NORME INTERNATIONALE

colour inside

Energy efficiency systems – Simple external consumer display

Systèmes pour l'efficacité énergétique – Affichage simple et externe du client

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INTERNATIONAL
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COMMISSION
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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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ENERGY EFFICIENCY SYSTEMS – SIMPLE EXTERNAL CONSUMER DISPLAY

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The text of this International Standard is based on the following documents:

Draft	Report on voting
23K/87/FDIS	23K/89/RVD

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

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INTRODUCTION

The reduction of CO_2 emissions is one the most challenging tasks today.

Providing the consumers with more information about their energy usage will allow them to make more informed choices and hence reductions.

Standardizing the communications interfaces between the metering systems and display will allow interoperability between the meter and display.

ENERGY EFFICIENCY SYSTEMS – SIMPLE EXTERNAL CONSUMER DISPLAY

1 Scope

This document specifies a data model to abstract the metering world towards a simple external consumer display. The data model, as described by means of functional blocks contained in this document, lays down the format of metering data accessible by a simple external consumer display. This data interface would be typically part of the meter communication functions and be accessed by a simple external consumer display via the H1 interface of CEN/CLC/ETSI TR 50572 between the display and the meter communication functions.

The data interface specified in this document may also be accessed by the LNAP or NNAP through the C or M interface, after which the data could be accessed by HBES devices through the H2 and H3 interfaces.

In other words, in this way the same data model can be used both on the H1 as well as the H2 and H3 interfaces.

This document does not specify the communication mechanisms used on the data interface, nor the applied data privacy and security mechanisms, nor the ergonomics of the simple external consumer displays, where national regulations can apply.

The document does also not specify the communication protocol used between the meters and the meter communication functions. However, it takes into account existing standards such as the EN 13757 series (in particular EN 13757-3:2018 and its Annex H) and the IEC 62056 series for the definition of the data model.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO/IEC 8859-1, *Information technology – 8-bit single-byte coded graphic character sets – Part 1: Latin alphabet No. 1*

ISO 4217, *Codes for the representation of currencies*

3 Terms, definitions and abbreviated terms

3.1 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- IEC Electropedia: available at https://www.electropedia.org/
- ISO Online browsing platform: available at https://www.iso.org/obp

3.1.1
meter
instrument for measuring, memorizing and displaying data related to the consumption of a commodity

3.1.2
data point
container element, in which information is located related to a function of a product (in e.g. memory or a register)

3.2 Abbreviated terms

Cs company specific

FB functional block

NA not allowed/not applicable

HVAC heating ventilation air conditioning

VIF/VIFE value information field/value information field extensions

C used to connect LNAPs and/or metering end devices to an NNAP

NOTE Typical interface technologies are for example (not limited to) narrowband PLC communication networks, local wired or wireless networks.

H1 interface which connects a metering end device to a simple external consumer display

H2 interface which connects a LNAP with auxiliary devices, for example a home automation or advanced display functionality

H3 connects an NNAP with auxiliary devices, for example a home automation or advanced display functionality

LNAP local network access point

L optional interface which allows an LNAP to be connected to zero or more peer LNAPs

N optional interface which allows an NNAP to be connected to zero or more NNAPs

NNAP neighbourhood network access point

A NNAP is a functional entity that, when equipped with C interface, allows access to one or more LNAPs or metering end devices and, when equipped with an H3 interface (interfaces), to advanced display/home automation end devices connected to the NN.

A NNAP may also allow data exchange between different functional entities connected to the same NN. The gateway functionality of the NNAP provides a connectivity infrastructure between meters and the central system. It utilizes two separate communication networks. It communicates with the central system via a WAN, and via a NN with the meters and/or LNAPs which it manages.

M M interface (metering end device interface), which is between the communications function of the meter and the LNAP or between metering end devices. The interface defines the access of external devices to internal data on the meter.

MDC meter data concentrator

DPT data point

4 Classification

Clause 4 is intended to show the general reference model in Figure 1.

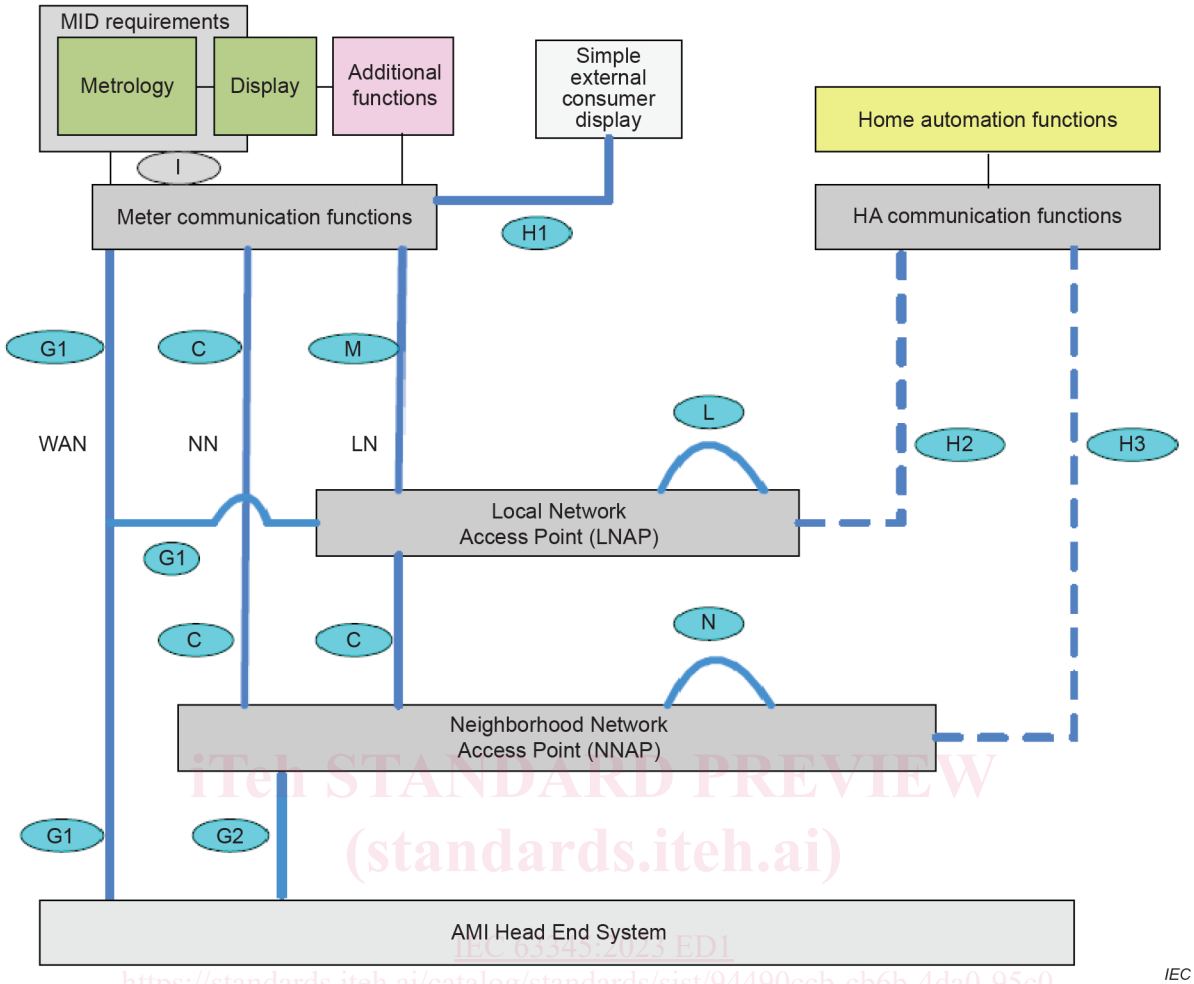

Figure 1 – Metering system topology from CEN/CLC/ETSI/TR 50572

In this document, a functional block is specified for each typical metering function, grouping a number of in- and output data points, as depicted in Figure 1.

Figure 1 depicts logical entities and not physical devices.

NOTE 1 This document does not define requirements for devices acting as data sources for the simple external consumer display (devices sending input on the I interface shown in Figure 1). These requirements are covered by other European standards.

In line with the architecture shown in Figure 1, the information flow on the H1 interface is predominantly from the meter communication function in one or more meters to one or more simple external consumer displays (or optionally one common display), whereby the latter acts as sink of the information obtained through the H1 interface from the meter communication functions. Where necessary, the consumer display may poll data from the meter communication functions, for example historical values. In no case shall it be able to alter metering data through the consumer display. Hence, most functional blocks of the data interface specified in this document contain data that are intended as output data to a connected display.

The data structures used on the H1 interface are part of this document. All other underneath described interfaces are informative.

NOTE 2 The wired meter communication according to EN 13757-2 is only applicable if it is used exclusively for the H1 interface.

The functional blocks specified in this document may also be accessed by the LNAP or NNAP through the C or M interface, after which the data could be accessed bi-directionally with HBES devices through the H2 and H3 interfaces.

The communication on the H2 and H3 interfaces is out of scope of this document

For each connected metering function, the corresponding metering communication function shall hold an entity of the corresponding functional block. The input for each connected metering function is supplied by meters and is not part of this document.

The input to the LNAP and NNAP is due to be part of the IEC 62746 series.

The measurable quantities shown in Table 1 can be represented in the data interface through the listed functional blocks (FB):

Table 1 – Measurable quantities

Physical media	FB
Other	M_GENERICM
Oil	M_GENERICM
Electricity	M_ELECM
Gas	M_GASM b)
Heat (outlet)	M_HEATM
Steam	M_GENERICM
Warm water (30°C to 90°C)	M_WATERM
Water	M_WATERM
Heat cost allocator	M_HCA
Cooling load meter (outlet)	M_HEATM
Cooling load meter (inlet)	M_HEATM
Heat (inlet)	M_HEATM
Heat and cool	M_HEATM
Breaker	M_BREAKERM
Valve	M_VALVEM
Waste water meter	M_WATERM

Annex A provides, for information, a cross-reference mapping between this document and COSEM/OBIS.

5 Requirements for the data interface

5.1 General

Each metering function shall be represented by a corresponding functional block, typically part of the metering communication function and accessed by a simple user display.

Some meters may also provide metering data history values (e.g. monthly data). It is highly recommended that, for each meter, a limited set of history values is available, for example covering the previous week, previous month or previous year.

Depending on national regulations, it can be necessary that some of the data survive power down situations.

In case of one common display unit supporting multiple meter devices, during installation and teach-in procedures of metering devices, a meter device directory shall be created to assign linked meters.

The format and management of the metering device directory is company and/or protocol specific and not part of this document. Appropriate procedures shall be provided to

– add a new metering device,
– replace a metering device by another device (with different identification number and e.g. different unit/resolution of the metering data), and
– delete a metering device.

The above workflow shall be supported by appropriate means (e.g. device localization via display, text information, etc.).

Two data points, "MeterReplacement" and "MeterReplacementCounter", are defined for each metering functional block to detect and manage replacement of metering devices. Further company specific mechanisms can be implemented to simplify the meter replacement workflow.

For each meter, a "UserText" may be configured to simplify identification and localization of the meter. This "UserText" can be useful in case of

– service, maintenance,
– binding of metering data to displays.
– billing information for the end user,
– etc.

In case of removal or deletion of a metering device from the device directory, it is highly recommended to keep the corresponding instance of the functional block alive and set all data in the functional block to void values (see below). It is not recommended to re-assign functional block indices of the remaining functional blocks because data processing by the data display could be corrupted.

After commissioning or power up, metering data can be void or outdated for hours until a new message from a metering device is received by the metering communication function.

On customer move out, certain data may need to be made unavailable for the next customer.

On supplier change, certain data needs to be made unavailable for the next supplier.

The "OutOfService" status attribute in metering data points shall indicate void data. This status attribute may be set in the following cases:

– no metering device is connected to the metering functional block (ex factory default data);
– a previously connected metering device is removed or deleted from the device directory. Handling of the metering device directory is manufacturer specific.

In case of meter replacement, all metering data in the corresponding functional block shall be set to void as upon removal of the previous meter until the first valid metering data message from the new device is received. This may take several hours.

NOTE This document does not foresee specific mechanisms to supervise the presence/function of connected metering devices using life-check mechanisms etc. Because of very manufacturer specific cyclic update periods for metering messages, a life-check "timeout" cannot be standardized. Therefore, this document does not put requirements to set metering data automatically "OutOfService" in case of missing/outdated data from the connected metering device.

The simple user display can access metering data by

– polling of functional blocks and data points,
– regularly by data being pushed to the display, or
– notifications or messages (e.g. sent by an external actor or generated by the meter). Data structures for this type of messages are not specified in this document.

5.2 Minimization of data transmission

Meter data comprises data that change infrequently and some that change frequently. The data transmission rate shall reflect the frequency with which the data is expected to change. In the case the data is polled, the user display shall not access a next data point value before the meter communication function has responded to the previous data point access, unless the meter communication function did not respond to the user display's request within a time that can be set manufacturer specific.

5.3 Data consistency

During polling of metering data, new metering data may be received and read out data may be inconsistent. For data consistency, checking each metering functional block shall provide a data point "RxSequenceCounter" that shall be incremented each time new metering data is received from the corresponding metering device.

The user display reading out metering data shall check the "RxSequenceCounter" counter before and after read out of the complete set of metering data. If the sequence counter value has changed, metering data may be inconsistent. The user display shall then retry the procedure.

5.4 Filtering of message types and data points

For a display, only a few message types are relevant. The special Request/Respond messages used for the Gateway to request special data are not relevant for a simple external consumer display. For the presentation of the data, the spontaneous meter messages with C=44h are recommended. Also C=46h or 06h could be taken into account, as they constitute special messages for installation purposes.

All other message types should be ignored. If a message is ignored, the reception time stamp "RxReceptionTime" shall not be changed.

It is recommended to limit the number of supported VIF/VIFE for a consumer display.

The following data points may be excluded from the interpretation:

– plain text VIF 7Ch/FCh, as used for very uncommon units;
– manufacturer specific VIFs 7Fh/FFh;
– extension table FDh.

The manufacturer shall consider to also limit the number of supported units from the extension table FBh.

6 Conformity and testing

The requirements for the data interface between the meter communication function and a simple user display are given in Clause 5.